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Influence of 6-Benzylaminopurine on enzymes of ammonium assimilation in maize seedling

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SUMMARY

The effect of different concentrations of benzyladenine (6-benzylaminopurine) on biochemical changes in root and shoot of six days old maize seedlings in terms of enzymes of ammonium assimilation was examined. The results revealed that glutamate dehydrogenase (GDH) activity was enhanced at lower concentration of benzyladenine but at higher concentration, the activity of this enzyme was declined. Glutamine synthetase (GS) activity decrease with increase in concentration of benzyladenine and it was highest at 1000 µm concentration. However, glutamate synthase (GOGAT) activity increased with increase in concentration of benzyladenine upto 100 µm and further increase in concentration resulted in decline of enzymatic activity. Protein and total nitrogen content increased upto 10 µm concentration of benzyladenine and it decreased further with increase in concentration both in root and shoot of maize seedling.

Key words : GDH, GS, GOGAT, Maize seedlings, Benzyladenine, *Zea mays.*

The role of cytokinin in plant growth and development remains unclear, although elevated levels of these growth regulators are often associated with tissues during periods of rapid cell division. The chemical manipulation of plant growth and development is an approach which has considerable potential for the qualitative as well as quantitative improvement of crop performance (Saxena *et. al.,* 2003). Benzyladenine has been widely used to improve crop productivity (Crosby *et al.,* 1981; Carlson *et al.,* 1987; Dyer *et al.,* 1987; Peterson *et al.,* 1990; Rani *et al.,* 1988). However, very little work has been done on effect of this growth regulator on enzymes of ammonium assimilation. Keeping in view, the present investigation was carried out to study the effect of conventional growth regulator 6-benzylaminopurine (benzyladenine) on the enzymes of ammonium assimilation *viz*. glutamate dehydrogenase (GDH), glutamine synthetase (GS) and glutamate synthase (GOGAT).

MATERIALS AND METHODS

Seeds of *Zea mays* L. cv. GANGA SAFED-2, procured from National Seed Corporation, New Delhi were surface sterilized with 0.1% $HgCl_2$ for 5 min. and then washed thoroughly with distilled water. The sterilized seeds were placed in 15 cm petriplate lined with Whatman No. 1 filter paper and allowed to germinate at 25 ± 2^0C under 14 hr. photoperiod of approximately 70 Wm^{-2} radiant flux density. There were three replications with 30 seeds for each treatment. The first set was supplied with Hoagland's nutrient solutions (Arditti and Dunn, 1969) to serve as control while set 2, 3, 4 and 5 were supplied with 10, 50, 100 and 1000 µm aqueous solutions of 6-benzylaminopurine, respectively. All the petri-plates were kept wet by supplying respective solutions daily. Emergence of radicle was taken as a criterion for the out set of seed germination in each treatment. On 6th day of sowing, roots and shoots of maize seedlings were used separately for nitrogen, protein and enzyme analysis.

Determination of enzyme activity:

Glutamate Dehydrogenase Activity:

Glutamate dehydrogenase (GDH) from the fresh sample was extracted in a mortar in a medium containing 0.5 M sodium phosphate buffer (pH 7.4), 0.4 M sucrose and 2mM EDTA. The ratio of plant tissue and medium was 1:4 (w/v). The samples were thoroughly extracted in cold (ice bucket) and the extract was centrifuged at 6000 rpm for 15 min. The clear supernatant was used as enzyme preparation. Enzyme was assayed by the method of Singh and Srivastava (1983).

Glutamine synthetase activity:

Enzyme extract were prepared in cold in a mortar containing 50 mM Tris-HCl (pH 7.8), 15% (v/v) glycerol, 14 mM 2-mercaptoethanol, 1.0 mM EDTA and 0.1% (w/v) Triton X-100. The extract was centrifuged at 6000 rpm for 10 min. The supernatant was used as enzyme extract. Enzyme was essayed by the method of Lillo (1984).

Glutamate synthase activity:

Enzyme was extracted in a medium containing 0.2

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